

Data Dictionary

Journal Article to be Published: The Use of Hollow Fiber Dialysis Filters Operated in Axial Flow Mode for Recovery of Microorganisms in Large Volume Water Samples with High Loadings of Particulate Matter

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The tables in the article are included in the spreadsheet entitled: Data for ScienceHub.xlsx.

A description of this spreadsheet is below.

Each table in the spreadsheet is in a unique worksheet. The titles of the individual worksheets correspond to the tables in the articles e.g., worksheet entitled "Table 2" contains the data in Table 2. (Table 1 has characterization data provided by another group in the EPA and is not included in the spreadsheet.

Each worksheet contains two versions of the table. The upper version is the table as it appears in the article. The lower version has additional columns that include the date when the experiment was done. An arrow connects the relevant data from the upper version to the lower version.

An example of one of the worksheets is below.

The date is also a link to the raw data. The raw data is in a separate worksheet at the end of the spreadsheet. If the link is clicked it will take the user to a summary of experimental conditions and the raw data used to calculate percent recovery.

| | | | | | | | | | | | | | | |
|----|--|----------------------|----------|-------|-------------------------------|----------|-------------------------------|----------|-------|---------------------------|---|---|---|---|
| K8 | | | | | | | | | | | | | | |
| | A | B | C | D | E | F | G | H | I | J | K | L | M | N |
| 3 | | Dead- End Axial Flow | | | Axial Flow with Recirculation | | | | | | | | | |
| 4 | | 150 mg solids/liter | | | 150 mg solids/liter | | | | | | | | | |
| 5 | Trial | 1st wash | 2nd wash | Total | 1st wash | 2nd wash | Total | | | | | | | |
| 6 | 1 | 36.1 | 10.5 | 46.5 | 34.4 | 14.9 | 49.3 | | | | | | | |
| 7 | 2 | 30.6 | 13.6 | 44.3 | 39.4 | 11.9 | 51.3 | | | | | | | |
| 8 | 3 | 31.7 | 8.9 | 40.6 | 45.56 | 12.07 | 57.63 | | | | | | | |
| 9 | Avg. | 32.8 | 11.0 | 43.8 | 39.8 | 13.0 | 52.7 | | | | | | | |
| 10 | Std. Dev. | 2.9 | 2.4 | 3.0 | 5.6 | 1.7 | 4.4 | | | | | | | |
| 11 | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | |
| 13 | Table 3. Percent Recovery of <i>B. globigii</i> spores, Axial Flow, Dead End and with Recirculation. | | | | | | | | | | | | | |
| 14 | Target spike: 100,000 spores/51 liters | | | | | | | | | | | | | |
| 15 | | Dead- End Axial Flow | | | Link | | Axial Flow with Recirculation | | | Link | | | | |
| 16 | | 150 mg solids/liter | | | | | 150 mg solids/liter | | | | | | | |
| 17 | Trial | 1st wash | 2nd wash | Total | | | 1st wash | 2nd wash | Total | | | | | |
| 18 | 1 | 36.1 | 10.5 | 46.5 | 1/16/2017 | | 34.4 | 14.9 | 49.3 | 3/14/2017 | | | | |
| 19 | 2 | 30.6 | 13.6 | 44.3 | 4/9/2018 | | 39.4 | 11.9 | 51.3 | 1/9/2017 | | | | |
| 20 | 3 | 31.7 | 8.9 | 40.6 | 4/10/2018 | | 45.56 | 12.07 | 57.63 | 1/13/2017 | | | | |
| 21 | Avg. | 32.8 | 11.0 | 43.8 | | | 39.8 | 13.0 | 52.7 | | | | | |
| 22 | Std. Dev. | 2.9 | 2.4 | 3.0 | | | 5.6 | 1.7 | 4.4 | | | | | |

links to
raw
data

Explanation of Raw Data

Below is an example of a section of the raw data. And below this example of raw data is a description of the pieces of data and how the data was processed to produce the data in the journal article.

| | | | | | | | | | |
|---|----------------------------------|-----|---------|----------|-----------|----------|-------------|------------|---------|
| 1/9/2017 | UF side port spiked turbid water | | | | | | | | |
| 1ml of 10-4 dilution, 50 L tap, 150 mg TSS. | | | | | | | | | |
| cut the filter open and put filter in a bag with volume from the retentate bottle. | | | | | | | | | |
| And stomached it for 60 sec on normal. Second wash with 250 ml, kept separate from first. | | | | | | | | | |
| Spike control | | | | | | spike | Volume (mL) | CFU/mL | |
| dilution | counts | | Average | CFU/mL | Log titer | 1.06E+05 | 277.66 | 381.8 | |
| 1.00E-07 | 109 | 103 | 106 | 1.06E+09 | 9.03 | | 250 | 424.0 | |
| | | | | | | | 527.66 | | |
| Spiked turb. Filter | | | | | | Total/mL | Average | % recovery | |
| 0.2 | 17 | 31 | 30 | 40 | 21 | 139 | 150.5 | 39.42 | |
| 0.2 | 20 | 41 | 42 | 33 | 26 | 162 | | | Total % |
| | | | | | | | | | 51.33 |
| Second Filter wash | | | | | | Total/mL | Average | % recovery | |
| 0.2 | 14 | 7 | 11 | 9 | 11 | 52 | 50.5 | 11.91 | |
| 0.2 | 7 | 7 | 18 | 9 | 8 | 49 | | | |

The above table is the raw data used to calculate percent recovery. The lines of text above the data describe the experiment.

The data in the table, will be described, in the following order: Top left to top right, then middle left to middle right, then bottom left to bottom right.

Data on the spiked amount of organisms

The top set of data contains the data on the amount of organisms that were initially spiked into the large volume sample. The "dilution" (e.g., 1.00E-07) is the dilution of the stock that was used to determine the starting concentration of the stock. In this example, a 10E-7 dilution (i.e., 0.1 ml of a 10E-6 dilution of the stock) were spread plated on TSA agar plates.

The "counts" refer to the number of colony forming units (CFUs) that grew up on the plates that were spread plated (see preceding paragraph.)

The "Average" is the average CFUs of the counts mentioned in the preceding paragraph.

The "CFU/mL" is the concentration of *B. globigii* organisms in the original stock suspension. This was calculated by dividing the average CFUs (mentioned in the preceding paragraph) by the dilution (10E-7) of the stock suspension that was spread plated. In this example: 106 CFUs/10E-7 = 1.06E9.

The "log titer" is the base 10 log of the concentration of *B. globigii* organisms in the original stock suspension, e.g., $\log_{10}(1.06E9) = 9.03$

The "spike" is the amount of organisms added (spiked) into the large volume turbid water sample. In this example, this was done by adding a 1 mL aliquot of the $10E-4$ dilution of the *B. globigii* stock. (The second line of text above the data summarizes this). To further illustrate, the amount of the spike is equal to the concentration of the stock multiplied by the dilution multiplied by the volume of the spike:

$$(1.06E9 \times 1.0E-4) \times 1 \text{ mL} = 1.06E5 \text{ spores added to 51 liters}$$

The next column, "volume" is the volume of the retentate. The top number is the volume of the first wash that was collected after stomaching the fibers. The middle number is the volume of the second wash, and the third volume is the total of first and second washes.

The next column, "CFU/mL" is the theoretical concentration of spiked organisms in the retentate if 100 % recover of the spiked organisms were recovered. In this example, the top number, (381.8 CFU/mL) is the concentration of the spiked organisms if 100 percent of the organisms were recovered in the first wash. The middle number, (424 CFU/mL) is the concentration if 100 percent of the spiked organisms were recovered in the second wash (and none in the first wash). These numbers are used to calculate the percent recovery of the organisms from the two washes.

The data in the columns entitled "btl wts." and "wt. of Btl." Refer to the weight of the bottle used for the retentate. These weights were used to calculate the volume of retentate.

Analysis of the first wash retentate for target organisms.*

Next, turning attention to the middle section of data starting with text "spiked turb. filter", this contains the data for the analysis of the first wash retentate for target organisms. The first column of data is the volume of the first wash that was spread plated. In this example 0.2 mL of retentate were spread plated on five plates, i.e., 0.2 mL each on 5 plates, in replicate.

The numbers to the immediate right of the 0.2 mL volume are the CFUs of the individual plates e.g., 17, 31, 30, 40 and 21.

The column entitled "Total/mL" is the sum of the CFUs of the individual plates (139) divided by the total volume that was spread plated over 5 plates (1 mL). This is the concentration of spiked organisms in the first wash: 139 CFU/mL. The next row of data is a replicate.

The column entitled "Average" is the average concentration from the two replicates mentioned above. This is the value used for the concentration of the spiked organisms recovered in the first wash. It is also the valued used in the calculation of percent recovery.

"Percent recovery" is the percent of spiked organisms recovered from the first wash. This is calculated by dividing the value in the preceding column (e.g., 150.5 CFU/mL) by the theoretical concentration of spiked organisms in the first wash if 100 % of the spiked organisms were recovered in the first wash (e.g., 381.8 CFU/mL). Thus percent recovery = $(150.5/381.8) \times 100 \% = 39.42\%$.

Analysis of the second wash retentate*

The bottom section of data entitled "Second filter wash" are the data for the second wash. The same method of calculation described in the preceding 5 paragraphs (i.e., the analysis of the first wash) was used for second wash calculations. The percent recovery for the second wash was 11.91 % in this example. This is calculated by dividing the concentration of the target organisms recovered in the second wash (50.5 CFU/mL) by the theoretical concentration of spiked organisms in the second wash if 100 % of the spiked organisms were recovered in the second wash (e.g., 424 CFU/mL): percent recovery = $(50.5/424) \times 100\% = 11.91\%$

The "Total %" is the sum of the percent recoveries from the first and second washes: $39.42 + 11.91 = 51.33\%$.

*In later experiments, i.e., the ones where the solids concentration was 750 mg/L and the ones where MS2 was the spiked organism, the two washes were combined and analyzed as one sample. For these cases, there will be only one volume of retentate given, one set of data for the spread plate analysis of the retentate, and one value for percent recovery.